AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Withdrawn) A recording method for using a plurality of coding tables to subject an input data word of p-bits to p-q modulation and to thereby obtain a code word of q-bits (q>p), in which said plurality of coding tables store the code words corresponding to the respective input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run length restriction rule even with the next code word coupled directly with the code word, and the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, said method comprising steps of:

referring to said plurality of coding tables during modulation of said predetermined input data word;

performing the DSV control; and

outputting a recording signal generated by inserting a synchronous signal for decoding reproduction data into every predetermined number of code words in a string of the code words satisfying said run length restriction rule on a recording medium side or a transmission medium side, wherein said p-bits are 8 bits, said q-bits are 15 bits, and said predetermined run length

restriction rule stipulates that a minimum run length of a signal obtained by subjecting said code word to NRZI conversion excluding said synchronous signal is 3T and that a maximum run length is any one of 11T, 12T, 13T, and 14T.

2. (Withdrawn) The recording method according to claim 1 wherein when said predetermined input data word is modulated, the code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word using said specific coding table, and an absolute value of a DSV value obtained from the code word modulated using said other specific coding table, and the DSV control is performed.

3. (Currently Amended) A recording method for using a plurality of coding tables to subject an input data word of ~~p bits~~ **8** bits to ~~p q~~ **8-15** modulation and to thereby obtain a code word of ~~q bits (q>p)~~ **15** bits, in which said plurality of coding tables store the code words corresponding to the respective input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run length restriction rule even with the next code word coupled directly with the code word, and a recording signal generated by inserting a synchronous signal for decoding reproduction data into every predetermined number of code words in a string of the code words satisfying said predetermined run length restriction rule and to be outputted is outputted on a recording medium side or a transmission medium side, said method comprising ~~steps of~~:

adding auxiliary information including a sector address and a parity by a product code to said input data word continuously inputted to constitute an ECC block;

subjecting said input data word in a format signal formatted in a predetermined format with respect to the ECC block to the ~~p-q~~ **8-15** modulation to generate a string of code words satisfying said predetermined run length restriction rule; and

inserting the synchronous signal including a bit pattern longer than a maximum run length of said predetermined run length restriction rule into every predetermined number of code words to generate the recording signal.

4. (Withdrawn) The recording method according to claim 3 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the DSV control is performed with reference to said plurality of coding tables, when said predetermined input data word is modulated.

5. (Withdrawn) The recording method according to claim 3 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the

number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word modulated using said specific coding table, and an absolute value of the DSV value obtained from the code word modulated using said other specific coding table, and the DSV control is performed, when said predetermined input data word is modulated.

6. (Currently Amended) The recording method according to claim 3, further comprising: ~~steps of~~

setting an **n (n ≥ 1)** consecutive ECC blocks as a set; and

repeating a processing for all rows of the respective ECC blocks, said [[the]] processing comprising ~~steps of~~ successively switching and arranging respective **r-th** rows of the respective ECC blocks and subsequently successively switching and arranging respective **(r+1)-th** rows in such a manner that respective first rows of the respective ECC blocks of the set are successively arranged on said recording medium or said transmission medium, and respective second rows are successively recorded/arranged.

7. (Currently Amended) The recording method according to claim 3, further comprising: ~~steps of:~~

setting two consecutive ECC blocks as a set; and

repeating a processing for all rows of said two ECC blocks of each set, said processing comprising ~~steps of~~ alternately switching odd-numbered data of a first row of one ECC block of the set and even-numbered data of a first row of the other ECC block by a data unit and arranging the data on said recording medium or said transmission medium, and subsequently alternately switching even-numbered data of the first row of one ECC block and odd-numbered data of the first row of the other ECC block by the data unit and arranging the data on said recording medium or said transmission medium.

8. (Withdrawn) The recording method according to claim 3, further comprising steps of:

dividing an x-rows y-columns data string constituted of said continuously inputted input data word and said auxiliary information into 1/m (m.gtoreq.1) in a row direction and forming m x-rows y/m-columns sub blocks;

first adding a first parity with a predetermined number of bytes to the respective sub blocks in a column direction; and

subsequently adding a second parity with the predetermined number of bytes to the sub blocks including said first parity in the row direction so that said ECC block is constituted by the m sub blocks.

9. (Withdrawn) A recording apparatus which uses a plurality of coding tables to subject an input data word of p-bits to p-q modulation and to thereby obtain a code word of q-bits (q>p), and in which said plurality of coding tables store the code words corresponding to the respective

input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run length restriction rule even with the next code word coupled directly with the code word, and a recording signal generated by inserting a synchronous signal for decoding reproduction data into every predetermined number of code words in a string of the code words satisfying said predetermined run length restriction rule and to be outputted is recorded in a recording medium, said apparatus comprising:

formatting means for adding auxiliary information including a sector address and a parity by a product code to said continuously inputted input data word to constitute an ECC block, and outputting a format signal formatted in a predetermined format to the ECC block;

modulation means for subjecting said input data word in said format signal outputted from said formatting means to the p-q modulation to generate a code word string satisfying said predetermined run length restriction rule, and inserting the synchronous signal including a bit pattern longer than a maximum run length of said predetermined run length restriction rule into every predetermined number of code words to generate the recording signal; and

recording means for recording said recording signal outputted from said modulation means in said recording medium.

10. (Withdrawn) The recording apparatus according to claim 9 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored

corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the DSV control is performed with reference to said plurality of coding tables, when said predetermined input data word is modulated.

11. (Withdrawn) The recording apparatus according to claim 9 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word modulated using said specific coding table, and an absolute value of the DSV value obtained from the code word modulated using said other specific coding table, and the DSV control is performed, when said predetermined input data word is modulated.

12. (Withdrawn) A transmitting apparatus which uses a plurality of coding tables to subject an input data word of p-bits to p-q modulation and to thereby obtain a code word of q-bits (q>p), and in which said plurality of coding tables store the code words corresponding to the respective input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run

length restriction rule even with the next code word coupled directly with the code word, and a recording signal generated by inserting a synchronous signal for decoding reproducing data into every predetermined number of code words in a string of the code words satisfying said predetermined run length restriction rule and to be outputted is transmitted via a transmission medium by radio or by a cable, said apparatus comprising:

formatting means for adding auxiliary information including a sector address and a parity by a product code to the continuously inputted input data word to constitute an ECC block, and outputting a format signal formatted in a predetermined format to the ECC block:

modulation means for subjecting said input data word in said format signal outputted from said formatting means to p-q modulation to generate a code word string satisfying said predetermined run length restriction rule, and inserting the synchronous signal including a bit pattern longer than a maximum run length of said predetermined run length restriction rule into every predetermined number of code words to generate the recording signal; and

transmission means for transmitting said recording signal outputted from said modulation means by said transmission medium.

13. (Withdrawn) The transmitting apparatus according to claim 12 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to

enable a DSV control, and the DSV control is performed with reference to said plurality of coding tables, when said predetermined input data word is modulated.

14. (Withdrawn) The transmitting apparatus according to claim 12 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word modulated using said specific coding table, and an absolute value of the DSV value obtained from the code word modulated using said other specific coding table, and the DSV control is performed, when said predetermined input data word is modulated.

15. (Withdrawn) A reproducing method for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 1 is recorded, or a transmission medium in which said recording signal generated using the recording method according to claim 1 is transmitted, said reproducing method comprising steps of:

detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium or said transmission medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these steps in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

16. (Withdrawn) The reproducing method according to claim 15 wherein the step of detecting said synchronous signal, subsequently detecting the auxiliary information including the sector address, an input data word (main data), and the parity based on the synchronous signal, reconstituting said ECC block, and reproducing said input data word comprises a step of including a part of a synchronous pattern of said synchronous signal in the data reconstituting said ECC block.

17. (Withdrawn) A reproducing method for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 3 is recorded, or a transmission medium in which said recording signal generated using the recording method according to claim 3 is transmitted, said reproducing method comprising steps of:

detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium or said transmission medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these steps in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

18. (Withdrawn) The reproducing method according to claim 17 wherein the step of detecting said synchronous signal, subsequently detecting the auxiliary information including the sector address, an input data word (main data), and the parity based on the synchronous signal, reconstituting said ECC block, and reproducing said input data word comprises a step of including a part of a synchronous pattern of said synchronous signal in the data reconstituting said ECC block.

19. (Withdrawn) A reproducing apparatus for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 1 is recorded, or a recording medium in which said recording signal generated using the recording apparatus according to claim 9 is recorded, said reproducing apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

20. (Withdrawn) The reproducing apparatus according to claim 19 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and said input data word is reproduced.

21. (Withdrawn) A reproducing apparatus for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 3 is recorded, or a recording medium in which said recording signal generated using the recording apparatus according to claim 9 is recorded, said reproducing apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

22. (Withdrawn) The reproducing apparatus according to claim 21 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and said input data word is reproduced.

23. (Withdrawn) A receiving apparatus for receiving a transmission medium in which a recording signal generated using the recording method according to claim 1 is transmitted, or a

transmission medium in which said recording signal generated using the transmitting apparatus according to claim 12 is transmitted, said receiving apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said transmission medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

24. (Withdrawn) The receiving apparatus according to claim 23 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information

including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and said input data word is reproduced.

25. (Withdrawn) A receiving apparatus for receiving a transmission medium in which a recording signal generated using the recording method according to claim 3 is transmitted, or a transmission medium in which said recording signal generated using the transmitting apparatus according to claim 12 is transmitted, said receiving apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said transmission medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

26. (Withdrawn) The receiving apparatus according to claim 25 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and said input data word is reproduced.

27. (Withdrawn) A recording medium wherein a recording signal generated using the recording method according to claim 1 or said recording signal generated using the recording apparatus according to claim 9 is recorded.

28. (Withdrawn) A recording medium wherein a recording signal generated using the recording method according to claim 3 or said recording signal generated using the recording apparatus according to claim 9 is recorded.

29. (Withdrawn) A transmission medium wherein a recording signal generated using the recording method according to claim 1 or said recording signal generated using the transmitting apparatus according to claim 12 is transmitted therethrough.

30. (Withdrawn) A transmission medium wherein a recording signal generated using the recording method according to claim 3 or said recording signal generated using the transmitting apparatus according to claim 12 is transmitted therethrough.

31. (Withdrawn) A reproducing apparatus for reproducing data from a recording medium in which a recording signal generated using the recording apparatus according to claim 9 is recorded, said reproducing apparatus comprising:

reproduction signal processing means for detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-i following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-l;

demodulating an output data word Dk-1 corresponding to said code word Ck-i with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

32. (Withdrawn) A reproducing apparatus for reproducing data from a recording medium in which a recording signal generated using the recording apparatus according to claim 9 is recorded, said reproducing apparatus comprising:

reproduction signal processing means for detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium;

detecting case information indicating a possible state of a code word **Ck** to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word **Ck** in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block,

and reproducing signals obtained thereby.

33. (Withdrawn) A receiving apparatus for receiving a transmission medium in which a recording signal generated using the transmitting apparatus according to claim 12 is transmitted, said reproducing apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-l corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

34. (Withdrawn) A receiving apparatus for receiving a transmission medium in which a recording signal generated using the transmitting apparatus according to claim 12 is transmitted, said reproducing apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by, reproducing data from said recording medium;

detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal;

computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1;

demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck;

repeating these in a time series order and obtaining an output data word string; and

detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

35. (Withdrawn) A recording medium wherein a recording signal generated using the recording apparatus according to claim 9 is recorded.

36. (Withdrawn) A recording medium wherein a recording signal generated using the recording apparatus according to claim 9 is recorded.

37. (Withdrawn) A transmission medium wherein a recording signal generated using the transmitting apparatus according to claim 12 is transmitted therethrough.

38. (Withdrawn) A transmission medium wherein a recording signal generated using the transmitting apparatus according to claim 12 is transmitted therethrough.